

REMARKS

Claims 1-30 are currently pending in the subject application and claims 1-29 are presently under consideration. A version of all pending claims is found at pages 2-8. Favorable consideration of the subject patent application is respectfully requested in view of the comments herein.

I. Objection to Specification and Rejection of Claims 1-29 Under 35 U.S.C.**§112**

The specification is objected to and claims 1-29 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. In particular, the specification is objected to because the Examiner asserts that it does not describe how to make and use scatterometry to measure multi-sloped semiconductor features or devices, and does not disclose how to use such scatterometry measurements to control the etching of such multi-sloped features and devices. It is respectfully requested that the objection to the specification and the rejection of claims 1-29 should be withdrawn for at least the following reasons. The specification provides ample enablement for both the use of scatterometry in the measurement of multi-sloped semiconductor features and devices, as well as the use of scatterometry to control the etching of such multi-sloped features and devices.

As has been argued and maintained throughout prosecution of the instant application, and specifically in the Appeal Brief filed October 17, 2003, the subject claimed invention relates to:

... methods and systems for *regulating* an etch process, when creating multi-sloped elements on a wafer surface. Such a system continuously collects parameters that can indicate a progress of the associated etching process, and the manner sloped features on a wafer are being developed at a given time. Based on such parameters, the system can *in-situ* adjust the associated etching process to obtain desired sloped geometry on the wafer's surface. *See*, Appeal Brief filed October 17, 2003, page 2, lines 18-23 (emphasis in original).

Further, the subject application as filed states:

The present invention provides a system that *facilitates controlling* etching devices with multi-sloped profiles. An exemplary system may employ one or more light sources arranged to project light onto one or more such devices with such profiles on a wafer and one or more light sensing devices (e.g. photo detector, photodiode) for detecting light reflected by, and/or allowed to pass through, the one or more devices with such profiles. The light reflected from, and/or passing through, the one or more devices is indicative of at least one parameter of the etching process (e.g. percent completion of etching, depth of etching, angle of profile) that may vary in correlation with the etching process. *See, page 3, lines 8-15* (emphasis added).

From the foregoing citations it is apparent that the subject claimed invention relates to a system and method that facilitates controlling and regulating an etching process while creating multi-sloped features on a wafer surface. The point of novelty of the system and method, as recited in claims 1-29, is therefore the combination of the scatterometry and etching process, wherein scatterometry readings are utilized by the etching process on a continuous basis to develop multi-sloped devices on a wafer substrate.

Moreover, utilization of scatterometry in conjunction with the etching process sufficient to enable one skilled in the art to facilitate the subject invention can be found at page 18, line 29 – page 21, line 18, wherein a technique for extracting information about a surface upon which an incident light is directed is explained. In particular, the cited pages in summary recite:

... a technique for extracting information about a surface upon which an incident light has been directed. Information concerning properties including ... critical dimensions of features present on the surface can be extracted. The information extracted can be extracted by comparing the phase and/or intensity of the light directed onto the surface with phase and/or intensity signals of a complex reflected and/or diffracted light resulting from the incident light reflecting from and/or diffracting through the surface upon which the incident light was directed. The intensity and/or

phase of the reflected and/or diffracted light will change based on properties of the surface upon which the light is directed.

* * *

Different combinations of the above-mentioned properties will have different effects on the phase and/or intensity of the incident light resulting in substantially unique intensity/phase signatures in the complex reflected and/or diffracted light. Thus, by examining a signal (signature) library of intensity/phase signatures, determination can be made concerning the properties of the surface.

See, page 18, line 29 –page 19, line 13.

Further, an exemplary fabrication process is illustrated in conjunction with Figures 15-17, the subject application stating at page 17, lines 6-19:

... an example fabrication process associated with forming a multi-sloped feature is examined. In Fig. 15, a multi-sloped feature monitoring system 1500 is illustrated directing light at a wafer 1506, whereupon a feature is being fabricated. At the fabrication point illustrated, the feature 1504 has yet to take on the recognizable aspects of a multi-sloped feature. The light being directed at the wafer 1506 and the feature 1504 is reflected back and collected by the multi-sloped feature monitoring system 1500, where it can be analyzed to produce information operable to control a directional etch process 1502 being applied to the wafer 1506 and the feature 1504. Conventional systems may employ pre-calculated parameters for controlling the directional etch 1502, and/or may stop the process at certain points to take snapshots of the progress of development. But *the present invention facilitates directing light at the wafer 1506 and collecting light from the wafer 1506 while the etch process 1502 is in progress, and further facilitates producing feedback information operable to control the etch process 1502.*

See, page 17, lines 6-19 (emphasis added).

It is respectfully submitted that the Examiner has unfortunately either misread, misunderstood or misconstrued the argument set forth by applicants' representative in the Appeal Brief filed October 17, 2003, with respect to the rejection of claims 1-29 under 35 U.S.C. §103(a) as being unpatentable over previously cited documents, i.e. Ausschnitt

and Coronel *et al.*

It is further submitted that the prior characterization of scatterometry and the process for generating multi-sloped features and devices as two distinct and separate processes as being well known in the art is correct, and such is noted in the specification. However, the point of distinction that applicants' representative has attempted to put forth and reiterate throughout prosecution of the instant application, and one that clearly distinguishes the subject invention over those cited by the Examiner to date, is the combination of a scatterometry system and an etching process, wherein the scatterometry system regulates *in-situ*, the etching process for the fabrication of multi-sloped features and devices. It is the combination of two previously known systems that provides the point of novelty, not the etching process or the scatterometry system as two separate and distinct processes. As was stated in *In re Rouffet*, 149 F.3d 1350, 47 USPQ2d 1453 (Fed. Cir. 1998):

...‘*virtually all [inventions] are combinations of old elements.*’ Therefore an examiner may often find every element of a claimed invention in the prior art. *If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue.* Furthermore, rejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention. *Such an approach would be ‘an illogical and inappropriate process by which to determine patentability.’* *In re Rouffet*, 149 F.3d 1350, 1357, 47 U.S.P.Q.2d 1453 (Fed. Cir. 1998) (*citations omitted*) (emphasis added).

Thus, the fact that scatterometry and the etching process may individually be well known does not *per se* preclude the applicants' inventive endeavor. Accordingly, in view of the foregoing, it is respectfully requested that the objection to the specification and the rejection of claims 1-29 should be withdrawn.

II. Rejection of Claims 1-29 Under 35 U.S.C. §103(a)

Claims 1-29 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Miller *et al.* (US 6,643,557) in view of the acknowledged prior art. This rejection should be withdrawn for at least the following reasons. The invention as claimed is not obvious in view of Miller *et al.* and the acknowledged prior art.

To reject claims in an application under §103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) *must teach or suggest all the claim limitations*. See MPEP §706.02(j). The *teaching or suggestion to make the claimed combination* and the reasonable expectation of success *must be found in the prior art and not based on the Applicant's disclosure*. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) (emphasis added).

As has been stated *supra*, the claimed invention as recited in the subject claims relates to a system and method that facilitates controlling the etching of multi-sloped features. In particular, independent claims 1, 8, 12, 13, 14, 15, 25 and 29 recite a similar limitation, the *in-situ regulation of an etch process*. Neither Miller *et al.* nor the acknowledged prior art, alone or in combination, teaches or suggests this feature.

As the Examiner readily concedes, Miller *et al.* does not teach using scatterometry to measure multi-slope features. Thus, in an attempt to rectify Miller *et al.*'s silence regarding the use of scatterometry to measure multi-sloped features, the Examiner resorts to applicants' specification to provide substantiation for the rejection.

The acknowledged prior art as related in the instant specification discloses two separate and distinct processes, i.e. a scatterometry system and an etching system, wherein two distinct steps are adopted to form a multi-sloped device or feature upon a wafer. First, the scatterometry system is utilized to provide information about a substrate, and second, once the scatterometry information is obtained, an etching process is utilized

to produce a multi-sloped feature or device upon the substrate. These two separate steps are nevertheless iterated numerous times until a multi-sloped feature or device within the correct tolerance is generated upon the substrate, but, as is disclosed in the subject specification, “[c]onventional systems … stop the process at certain points to take snapshots of the progress of development”. *See*, page 17, lines 14-16. The invention as claimed on the other hand “facilitates directing light at the wafer and collecting light from the wafer *while the etch process is in progress, and further facilitates producing feedback information operable to control the etch process.*” *Id.* (emphasis added). Thus the crucial distinction between the invention as claimed and the prior art is that there is no discontinuity between obtaining measurements through the scatterometry system and the etching process; the system and method as recited in the subject claims does not need to stop the etching process to take measurements through the scatterometry apparatus in order to generate multi-sloped devices and features. Thus, neither Miller *et al.*, nor the acknowledged art teaches or suggests the invention as claimed.

Moreover, it would appear that the Examiner is basing the rejection on the assertion that it would have been obvious to do something not suggested in the art based on the advantages disclosed in applicants’ specification. It is after all, the applicants’ specification that the Examiner cites to substantiate this rejection. This sort of rationale has been condemned by the CAFC as being sophistic; *see e.g. Panduit Corp. v. Dennison Manufacturing Co.*, 1 USPQ2d 1593 (Fed. Cir. 1987). Thus, it is submitted that a *prima facie* case of obviousness has not been established against the applicants’ claimed invention and there is no proper and acceptable basis for a rejection under 35 U.S.C. §103. Accordingly, the rejection of independent claims 1, 8, 12, 13, 14, 15, 25 and 29, and associated dependent claims, should be withdrawn.

CONCLUSION

The present application is believed to be in condition for allowance in view of the above comments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063.

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,
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